The effect of house prices on the long-term care market: Evidence from England

Volodymyr Bilotkach and Nils Braakmann and Eduardo Gonzalo-Almorox and John Wildman

Newcastle University

16 October 2017

The effect of house prices on the long-term care market: Evidence from England

Volodymyr Bilotkach[*]

Nils Braakmann[*]

Eduardo Gonzalo-Almorox[*,+]

John Wildman[*]

October 2017

High house prices are often considered to be beneficial for the elderly due to the accumulation of wealth. However, as land is an input in the provision of public services, the elderly might be harmed by them, for example, due to a shortage of local care homes. Alternatively, care home providers might be attracted by asset-rich potential clients, which could lead to a positive effect of house prices on the provision of care. Applying an instrumental variables approach on English data, we show that higher house prices lead to fewer care homes, fewer entries into the market as well as fewer available beds.

Keywords: Care homes, house prices, long-term care, England
JEL: R31, I11

[*] Newcastle University. 5 Barrack Rd, Newcastle upon Tyne NE1 4SE
[+]Corresponding author: e.gonzalo-almorox@newcastle.ac.uk

All analyses used Stata 14. Do-Files are available from the corresponding author on request. All analyses and opinions expressed in this paper as well as any possible errors are under the sole responsibility of the authors. The land registry data is released under Open Government Licence for public sector information (http://www.nationalarchives.gov.uk/doc/open-government-licence/). The land registry data covers the transactions received at the Land Registry in the period October 1st, 2014 to September 30th, 2016 and is covered by Crown copyright. If you have found an error with the data, please contact Her Majesty's Land Registry (HMLR).

Authors thank Àlex Pérez-Laborda, Luke Munford and participants at the 5th PhD Student Workshop in Industrial and Public Economics in Universitat Rovira I Virgili and the Health Economics Study Group in Aberdeen for helpful comments and suggestions in early versions of the paper. Financial support from ESRC is gratefully acknowledged. The usual disclaimer applies.

1. Introduction

The English housing sector has experienced the fastest growth in real prices amongst all OECD countries over the last decades. Between 1997 and 2016 the median price paid for residential property increased by almost 260%, while median individual earnings increased by 68% (Henretty, 2017). A widely-discussed consequence of this process has been an affordability crisis that has particularly affected young and first-time buyers. These two groups have struggled to access mortgages and raise the necessary initial deposits to invest in housing (Hilber, 2017, Hilber and Vermeulen, 2016). At the same time, older home-owners are believed to benefit from this situation, as they were able to buy properties cheaply and now benefit from increases in housing wealth – even though realizing these gains obviously depend on the decision by the older homeowners to sell their properties and live in a cheaper area or smaller properties (Hilber and Schoni, 2016, Hiller and Lerbs, 2016). In this paper, however, we point out that the picture might be more complicated. Areas with high house prices, may inhibit the opening of new care homes, which in turn harms older home owners if these either cannot access sufficient care, have to delay their entry in a nearby care home or are forced to relocate in old age and consequently leave behind existing personal networks and connections.

The demand for long term care services that involve health care and help with activities of daily living has increased substantially over the last decades. A main factor for this increase has been an ageing population. Hence, the proportion of people with at least one difficulty has increased from 16.4% at age 65 to almost 50% at age 85 (AgeUk, 2017). In addition, changes to family structures and living habits have also led to a shift towards paid formal care provision by nursing and residential care homes instead of more informal care within the (extended) family (Kaschowitz and Brandt, 2017; van Groenou and De Boer, 2016).

This paper investigates the relationship between housing and long term care markets. Our analysis can be motivated by figures 1 and 2 that show large spatial disparities in the local availability of care homes (figure 1) as well as a wide variation in property prices (figure 2) across English districts. The direction of an eventual link between these two variables is a priori unclear. While higher house prices lead to increases in wealth for existing home owners, many of which are old, and thus to greater funds available to pay for care in old age (Darton et al., 2010), the opening of care homes requires space. Consequently, higher house prices lead to higher input prices for care home providers, which should lower the supply of care homes for a given demand. A possible consequence is that the available long term care choices are

reduced for people living in these areas. The overall effect of higher house prices on the provision of social care then depends on the relative size of these two effects.

(Figures 1 and 2 about here.)

We use data for care home from the Care Quality Commission, the official regulator for care homes in England, which we combine with data on all housing transactions from the Land Registry, a government department founded in 1862 that serves as the central registry for all land owners in England and Wales. Considering a context of health and healthcare, the former dataset has been used to analyse the effects of housing book on individual health (Fichera and Gathergood, 2016). From these sources, we construct a local authority-level dataset for England from 2011 to 2016. A potential problem of the analysis is that long term care providers may choose local markets on the basis of unobservable variables that also affect house prices. If this occurs, the estimated effects of the house prices may be biased. To overcome this potential limitation, we use an identification strategy based on Hilber and Vermeulen (2016) that exploits differences in the tightness of planning regulations and in the share of available land across English local authorities. Our key findings suggest that higher house prices indeed lead to fewer care homes. Moreover, we also find some evidence of quality upgrading where areas with higher house prices have more care homes rated as "outstanding" and some weaker evidence for a corresponding increase in the number of care homes rated as "bad".

This paper contributes to the growing literature on the study of the residential long term care market in England. Our main contribution is to provide the first evidence for a causal link between house prices and long term care provision. The analysis of the former relationship, in addition of providing significant insights about the organization of formal social care services, is also important given the key role played by value of the properties in the definition of the means tests that determine the eligibility for public support as well as define several sources of funding to meet local spending needs. The provision of long term care has been analysed by a number of authors. Forder and Allan (2014), using cross-sectional data, provide a detailed analysis of elements that determine competition amongst care homes and assess the consequences of this competition for both prices and quality. Using the house prices as an indicator of the payer composition, their results show a negative correlation between the prices paid for care home services and the prices of nearby houses. Likewise, they find a positive correlation between the house prices and probability of a care home obtaining a higher quality rating. Other authors, have explored the dynamics of the care home market by analysing

elements that lead to care homes closures. Netten et al. (2003, 2005), find that closures may be associated with the prices set in the care homes. Hence, lower prices would lead to higher closer rates. Allan and Forder (2015) explore other element such as the quality and show that poorer quality and more competitive markets are elements that increase the probability of market exits. In contrast to this research, our paper joins Machin et al. (2002) on providing evidence on factors related to entries into the care home market. Their results suggest that the introduction of the UK national minimum wage had a negative, but statistically insignificant effect on care home entries. Our paper is also related to Mc Millen and Powers (2017) who analyse the factors that determine location decisions of care homes. Considering the market of nursing care homes in California and using a spatial econometrics approach, they conclude that nursing care homes tend to locate in densely inhabited areas with older and wealthier populations.

This paper is organised as follows. The next section outlines the main institutional characteristics characterising the market for long term care and housing. Section 3 describes the data and the empirical strategy Section 4 discusses the results and section 5 concludes.

2. Institutional background

In England, urban planning and long term care are organised on the level of local government, specifically in local authorities. These are roughly comparable to US counties and usually encompass one city or some larger rural area. Some areas have a two-tier structure with some decisions taken at the (lower) district council level and others at the (higher) county council level, while others are unitary authorities that combine both tiers.

Urban planning is managed at the district level. Local planning decisions are based on a National Planning Framework that guides policies and development decisions to meet local socio-economic, cultural, security and health needs. Local planning policies have long been regarded as one of the main constraints on the housing supply and a main reason for the increase in house prices[1]. English planning regulations are more restrictive than other countries (Cheshire, 2009; Hilber, 2015). In addition, they can lead to incentives for existing home owners to promote "not in my backyard" policies that restrict local development and consequently the supply of local housing. These tighter regulations lead to increases in the

[1] In addition, the effects of planning regulations have been studied also in other contexts such as the retail sector for the UK (Cheshire et al., (2014), Griffith and Harmgart, (2008), Haskel and Sadun, (2012), Sadun, (2015) France (Bertrand and Kramarz, 2002), Italy (Schivardi and Viviano, 2011) or Spain (Sanchez Vidal, 2016).

land value of those areas already developed. Conversely, for owners in less developed areas these policies imply a cost (Hilber and Robert-Nicoud, 2013).

Long term care is managed by 152 local authorities that operate at the council level.[2] The main responsibility entails the commissioning (i.e., the purchase) of care services for those clients eligible for public support. Since the mid-eighties, the provision of long term care operates according to market mechanisms. As a result, the *for profit* private sector has emerged as the main provider. In 2014, 74% of the total places belonged to a private provider compared with 8% of places provided by the public sector. The remaining 18% of the places were provided by the voluntary sector (Jarret, 2017)

There are 19 private and 6 voluntary providers that have a combined market share of about a 30% of the beds available. Within these, 4 providers are big chains with a combined market share of 15%. The remaining 70% of the market share is served by smaller providers that individually provide no more than 0.4% of the beds each. The resulting market is considered to be fairly competitive, but also regionally fragmented.[3]

One explanation for these regional discrepancies is the composition of long term care recipients in each local authority. Care homes may have two types of clients depending on how they fund their services. The first are private clients who purchase and fund their care individually based on their willingness to pay for different types of services. The second are clients whose care is partially or fully funded by the local authorities. The eligibility and degree of this public support is based on a means-test that assesses their financial capacity. The market for this type of clients works as a quasi-market in which the local authorities purchase care services from private providers on behalf of the clients (Le Grand, 1991)[4]. The proportion of publicly funded clients is notably higher than the number of self-funded clients (Jarret, 2017).

The fact that local authorities purchase care on behalf of a significant part of the demand, suggests that they may have certain buyer power when negotiating the fees applied to publicly

[2] Before 2008, these activities were managed by Primary Care Trusts (PCT), which were the top tier administrative structure of the National Health Service. The Health and Social Care Act (2008) transferred public health matters, including long term care activities, from these PCTs to local authorities. In other areas, PCTs were replaced by clinical commissioning groups (CCG).

[3] Considering registered care homes in all sectors, the South East is the region that has more registered care homes (currently more than 1,000). This proportion of care homes contrasts with the North East where there are about 360 registered care homes.

[4] The same approach has been applied for the delivery of various public services in the UK. Using the nursing and residential care market, Barron and West (2017) analyse the performance of different types of providers in terms quality standards. Their main result suggests that facilities that operate in quasi-markets are, on average, of higher quality than those operated by for profit providers.

funded clients. This power pushes prices down and lead to lower fees paid by the local authorities for the same services that private payers receive. This case suggests a potential cross subsidisation of privately funded clients to publicly funded clients. This situation has been documented both in the English long term care market (Forder and Allan, 2014, Hancock and Hviid, 2010, OFT, 2005) and in the US (Grabowski, 2004, Mukamel and Spector, 2002).

3. Data and empirical strategy

3.1 Data

We obtain data for local authorities that operate at district level from various sources for the period October 2014 to September 2016. The choice of the time period is determined by the availability of some of the data. Information concerning the characteristics of care homes is obtained from the CQC directory of active and inactive care homes[5]. The data contain all registrations of care homes that have carried out a regulated activity since 2010. The initial sample includes 24,354 records. A substantive proportion of these registrations (16,054) that were carried out during 2010 and the first two months of 2011 due to a new legal requirement for existing providers to be registered with the Care Quality Commission. Restricting the data to the period from October 2014 leaves us with data on 1844 care homes.

We consider the entry date of a specific care home to be the date of registration. We also drop registrations that are due to organisational reasons such as changes in the address or take overs from a different provider[6]. From this information and the address of the care home, we calculate our main dependent variable as the number of care homes per 1000 population that are aged 65 or over in the local authority. This definition is based on Tokunaga and Hashimoto (2013) who analyse the entry of private providers in Japanese long term care markets. Population data comes from the projections of the Office of National Statistics for the years 2015 and 2016. The former figures are mid-year estimates as of 30th of June of each year.

Furthermore, we analyse the effect of the house prices on market entry. We calculate market entry rates adopting an ecological approach that considers the number of new registered care homes relative to the number of incumbents at the beginning of the period. This definition of

[5] This dataset is maintained by the CQC Directorate of Data and Statistics and available upon request.
[6] This situation is typically found when dealing with information contained in registries of firms. Neglecting it, apart from potentially introducing measurement errors, may lead to incorrect conclusions regarding the market dynamics and the performance of the firm. Geurts and Van Biesebroeck (2016), for instance, analyse the effect of this measurement problem on the estimations of the firm's growth after the entry in the market

entry rates is a relative measure to compare the process of entry in markets with different sizes (Audretsch and Fritsch, 1994).

The data provide further information on the number of beds in each care home, the postcode and postal address, the city and region where the care home is located as well as the local authority that is responsible for the purchase of social care services for publicly funded clients. We use this information to generate two further outcomes, namely the number of newly registered beds in a period as well as the average size of existing care homes.

We also use information on care homes' quality ratings from the inspection system implemented by the CQC since October 2014. The main changes incorporated with this new system were essentially two. First, inspections conducted without prior announcement. Also, more systematic and structured inspections. Thereby, the evaluation consider explicitly five quality components of the services that include the safety, the effectivity, the level of care and response to people's needs as well as the management and leadership of the services. In addition to these individual assessments, the CQC also releases an overall evaluation of the services. We use this general measure for our analysis. Besides, each of these quality dimensions is assessed according to four possible ratings namely *outstanding, good, requires improvement or inadequate*. We merge the latter categories i.e. requires improvement and inadequate into a single category *bad.* For working out these ratings, inspectors use a variety of sources that include quantitative measures as well as the feedback from residents and relatives.

For our analysis, we collapse this data on the level of 315 (district-level) local authorities and two time periods from October 2014 to September 2015 and October 2015 to September 2016. Some of the variables we use are measured before 2008. This creates a potential issue as the English local government was restructured in 2008 resulting in the transformation of some counties into new Unitary Authorities. Our main analysis uses only those local authorities that did not undergo any changes. Additionally, we have rerun all analyses using averaged values for these new Unitary Authorities. Results are essentially identical.

Information on property prices is obtained from the price paid dataset released on a monthly basis by the Land Registry. This dataset contains all the transactions of properties carried out in England and Wales since 1995. In addition to the price paid and the exact date of the transaction, the dataset includes further information such as the type of property, the address, the city, district and region where the property is located as well as whether the location was

newly built and whether the property was under leasehold or freehold[7]. We aggregate this information on the same level as the care home and obtain the average price[8] for each time period.

3.2 Identification

We estimate regressions that follow the general form

$$Y_{irt} = \alpha + \tau log P_{irt} + \delta_r + \eta_t + \epsilon_{irt} \qquad (1)$$

where Y_{it} is the respective outcome variable i.e., proportion of care homes per 1000 population over 65, entry rates, number of newly registered beds and average size of entrant care home, for a local authority *i* in time period *t.* P_{it} is the average house price. We also include δ and η which are dummy variables for each region where the local authority is located and for the time period. The rationale of these variables is to control for all those factors, observed and unobserved, that are constant within each region and time. We are interested in estimating τ. An important concern related to the OLS estimates of τ in (1), is that they are likely to be biased as we can easily imagine unobserved factors that influence both house prices and the provision of care homes. For example, the general wealth of an area. In addition, we can also imagine potential reverse causality between the number of care homes and the level of house prices if care homes are a (dis-) amenity that changes the quality of the neighbourhood and potentially the values of the properties in an area. A potential candidate to address these problem would be the use of the index of deprivation as a control. However, it presents the concern that it can be related to the house prices and it may produce endogeneity limitations.

In order to tackle these problems, it is necessary to obtain a source of exogenous variation in the house prices. For doing that, we borrow an identification strategy from Hilber and Vermeulen (2016) who consider the link between supply side constraints, such as the available land and the tightness of planning regulations, and house prices in England. As contemporaneous measures in supply side constraints are likely to be endogenous and therefore they use a variety of instruments. Their findings confirm that tighter supply constraints, such as less available lands and more restrictive planning regulation, lead to increases in the prices.

[7] The difference between these two types of properties is based on the whether the ownership of the land or property is for a temporary (*leasehold*) or unrestricted (*freehold*) period.
[8] The average price is calculated applying the geometric mean. This method has been adopted by the Land Registry instead of the arithmetic mean in order to correct the potential skewness from high property values.

In our case, we use their instruments to instrument for our treatment variable, house prices. The rationale of our identification strategy is that if a variable (Z) it is used as an instrument for addressing the endogeneity that the supply constrains (X) may have when establishing the causal link with the house prices (D), as Hilber and Vermeulen (2016) show with their first and second stage estimates, then this variable Z can be also considered as a valid instrument for addressing the endogeneity in the house prices (D). We illustrate the former in figure (3).

(Figure 3 about here)

Hilber and Vermeulen use two instruments for the tightness of local planning regulations. The first, is based on the impact of a planning reform aimed at speeding up the planning processes. Set in 2002, this reform included the establishment of an explicit target for concluding major development projects with explicit aim of avoiding delays of major projects. Local authorities had incentives to reach this target as funds from the central government could be retained otherwise. The instrument used by Hilber and Vermeulen (and us) is the change in the delay rate of major projects pre- and post-reform. The underlying logic is that more restrictive local authorities likely had more delays pre-reform and consequently had to change their behaviour more strongly than more permissive local authorities after the reform. A potential criticism of this instrument is that the effects of this regulation may have affected to certain extent the development and provision of care homes in a local authority. If this is the case, then local authorities with greater differences in their delay rates would be those more restrictive and in principle would reject more planning projects that would include also care homes. In figure 3 we show the relationship between the average delay rates and the number of care homes per 1000 people older than 65 for each local authority. Delay rates do not influence on the number of care homes ($\rho = 0.023$). Two reasons may explain this weak association. Firstly, major projects and more in general the design of planning regulations, mostly refer to projects that involve dwellings. Residential care homes normally fall under a different category that integrates care facilities such as hospitals or nursing care homes. In these cases, the applications may not be tested considering the housing development plans and may be approved despite the limits imposed by future settlements (King 2011). Likewise, the development of care homes planning also involves other local authorities different to the local planning authorities. Thus, in two-tier authorities, the county local authorities are in charge of the funding and commission of the services. Their aims may be different from the purposes of the local authorities that manage planning regulations.

(Figure 4 about here)

Hilber and Vermeulen's second instrument links local planning regulations to local political power. In addition to Hilber and Vermeulen (2016), similar strategies have been used by other authors such Bertrand and Kramarz (2002) or Sadun (2015). The information used here corresponds to the share of the Labour party in the General Election of 1983 at the local district level. Hilber and Vermeulen obtain and compile these data at the level of the Constituency boundaries and then match them to the level of the local district authority by using GIS techniques. The underlying logic of this instrument is that Labour voters were historically predominantly low- and middle-income, and working-class. These voters gain from additional construction activity, both through more easily affordable homes and additional jobs. Furthermore, they are unlikely to own (more expensive) houses that could lose in value. Using data from a general election also ensures that local concerns, such as those related to housing, do not play a dominant role in voters' decisions. Our regressions additionally include the Labour vote share in the most recent general election (June 2015). By using this variable we aim to control for changes in the demographic composition of areas that may lead to a more Labour-friendly population and may alter the voting behaviour and consequently the corresponding local policies. Cheshire et al (2015), for example, allude to the case of some neighbourhoods in London receiving important proportions of new wealthy residents when analysing the relationship between supply restrictions and housing vacancies.

Hilber and Vermeulen additionally look at physical constraints as another mechanism that may restrict the supply of houses. The share of developed land may be subject to endogeneity concerns given that it may be discretionarily determined by the local authorities. To correct for these potential problems, we instrument the share of developed land with the population density in 1911 with the underlying logic that land is pricier in historically more densely populated areas.[9]

[INSERT TABLE 1 HERE]

Table 1 displays the descriptive statistics for our estimation sample. On average, over the period of analysis there were about 1 care homes per 1000 population over 65. Looking at the

[9] Data on the instruments comes from the replication data from Hilber and Vermeulen (2016) available at Christian Hilber's website: http://personal.lse.ac.uk/hilber/. A copy of this data is also available as the supporting information in the electronic copy of the article. The Appendix provides a detailed explanation and description referred to the computation of the data used.

care homes that are inspected, we can see that there is a surprisingly low number of care homes that are rated as outstanding. Conversely, the average number of care homes that are rated as "bad" per 1000 population over 65 is 0.33. Likewise, Table 1 provides further information on the dynamics of the market. Entry rates vary substantially across the sample with a comparatively low average of 1.97%. Nevertheless, some local authorities reach values as high as 18.75%. The average size of the new care homes since October 2014 is 11 beds with a minimum of zero (equivalent to no new homes entering) and a maximum of 135. Local authorities gain on average 15 new care home beds per period. House prices are also highly variable across regions with an average of £245,036, but a range at the lower end of 71,447 and more than £1M for some local authorities in London.

Table 2 shows the results corresponding to the first stage statistics for our estimation. We combine the instruments related to the regulatory constraints and the instrument for the physical constraint. The first two columns, present estimates that use the change in the delay rate and the local share of Labour voters in combination with the historical population density (columns (1) and (2) respectively). Column (3) considers all the instruments. The estimates point at the direction that we would expect from Hilber and Vermeulen (2016) - the relaxation of planning constraints lowers house prices, while higher (historical) population densities increase them. Likewise, the results associated with the local share of Labour voters also confirm the negative relationship presented before. The bottom of Table (2) presents Sanderson-Windmeijer (2016) multivariate F-tests for the excluded instruments. These evade the problem that simple F-tests in the case of multiple instruments can be misleading as they could mask a combination of strong and weak instruments. These results indicate the absence of any weak identification problems for all our endogenous regressors. Moreover, all the F statistics are above 10 which is the value suggested by Staiger and Stock (1997) as acceptable to reject the null hypothesis of weak instruments.

[INSERT TABLE 2 HERE]

4. Results

Table 3 looks at the link between contemporaneous house prices and the number of care home per 1000 population over 65 as well as the house prices and the rate of market entry. In both cases, the results reported in column (1) show OLS estimates, while columns (2) to (4) present various IV specifications. All our estimates suggest that higher house prices decrease the number of care homes. The effects, which in general are significant at the 1% level, indicate

that an increase of a 100% in the level of prices entail reductions of 0.9 to 0.5 care homes per 1000 population over 65. Expressed in terms of standard deviations, our results suggest that 1% increase in the log of the house prices lowers the number of care homes by a range of 127% to 240% of a standard deviation. These results depend on whether we include the whole set of just one of the instruments concerning the regulatory constraints. In any case, these results suggest that the production cost effect derived from higher house prices dominates any eventual demand effect operating through potential clients becoming wealthier.

The right panel in Table 3 considers the impact of house prices on the entry rates of care homes.. Again, we find a negative causal relationship between the house prices and the entry dynamics of the market; increases in house prices deter care homes from entering in those markets. Specifically, a 1-log point increase in house prices reduces the entry rate by up to 2.4 percentage points with the specification using the Labour share as an instrument for planning regulations. This estimate is very similar to the case when we instrument considering all the instruments. In terms of standard deviations, these results suggest that an increase of 1% in the house prices lead to decreases of the entry rates between 68% and 73% of a standard deviation depending on the instruments used.

[INSERT TABLE 3 HERE]

A potential concern is that the decision of entry in the market may be lagged to certain extent. For instance, providers may base their decision to enter a local market on historical house prices or the date of registration of the care home may differ from the date of the purchase of the property. Table 4 explores the effects of lagged house prices on the number of care homes and entry rates respectively. We apply a lag of 2 years in the house prices. The choice of this lag fits the time frame required for setting up and opening a care home. This process entails not only the construction of the building but also the application of "statement of purpose" and the confirmation of a registration. The effects using the lagged price, although lower, are generally along the same lines as the findings presented in Table 3. Thus these findings suggest that potential different time frames do not affect our analysis.

[INSERT TABLE 4 HERE]

In general, these findings suggest that the decision of entry by long term care providers in local markets may respond mainly to financial incentives that determine the cost of development[10]. Investing in the development of a care home in areas where the value of alternative uses of land, such as housing, are high, may entail high opportunity costs. Developers may prefer to develop houses instead of care homes despite having a potential demand. Furthermore, in order to develop a new care home, developers have to compete with other types of developers such as house builders for getting available land. Due to their greater profit margins, house builders may be willing to pay higher prices for a site. Also, both local and national funding schemes do not contribute to provide the right incentives for the development of new care homes either. For instance, at local level the charge of the Community Infrastructure Levy on net additional spaces which are required in a care home but that are not subject to rental revenues – laundries, common rooms, or the reluctance in some cases to grant planning permissions, may difficult the viability and therefore disincentivise the development of new care homes (Campbell, 2015). Other grants at national level such as the New Homes Bonus pay local councils for creating new homes in their area.

We also observe how house prices affect the capacity of those care homes registered since October 2014. We consider the capacity from two perspectives: the total number of beds newly registered in a local authority and the average size of the care homes registered in the local authority. The results of the impact of the house prices are reported in Table 5. We find evidence of a negative effect so that higher house prices lead to the registration of fewer beds and smaller care homes. Yet in most of the cases, these effects are statistically insignificant. They are only significant at the 10% level for the average care home size when instrumenting with the Labour share of voters. These findings suggest that a 1% increase in the house prices imply a reduction in the average size of the newly registered house of about a 62% of a standard deviation.

[INSERT TABLE 5 HERE]

Although these results are not conclusive in terms of statistical significance, they are consistent across the different specifications that we use. We can outline two implications derived from them. First, older populations living in areas where house prices are high would face a

[10] See for example: https://www.carehome.co.uk/news/article.cfm/id/1568598/affluent-self-funders-market-in-the-south-driving-care-home-operators-away-from-the-north

restriction in the long-term care choices available to them. Particularly there would be fewer beds available for them. Second, despite having fewer options regarding the provision of care, the services could be of better quality. Bigger care homes tend to have lower levels of quality since they encounter more difficulties to provide a more personalised care (Barron and West, 2017). A core characteristic considered by CQC in those services rated as good and outstanding is their capacity to engage with patients, their families and carers in order to meet people´s diverse needs (CQC, 2016).

We explore this quality aspect in further detail. In addition to the differences in quality derived from a different care home dimension, it may be possible that house prices affect directly on quality level in the care home. There is evidence that care homes rely on privately-funded clients to cross-subsidize publicly-funded clients. Humphries et al. (2016) argue that this strategy is followed by a number of long term care providers in order to preserve their financial viability. This argument would suggest that areas with a greater proportion of clients that self-fund their care should be more attractive for care homes.

Given that self-funded clients in the UK are price takers, they also choose which care home they use. In particular, it seems reasonable to assume that they prefer better care homes over worse. If higher house prices imply more asset-rich clients who can afford better care, care homes can execute a vertical quality differentiation in those areas and set higher fees for services of better quality. If this occurs, we would expect a positive effect of house prices on the quality of care homes in an area.

Table 6 reports the results of the effect of house prices on the number of care homes per old population by quality rating. The left panel shows information on the care homes that are rated overall as outstanding. The IV estimates reveal a positive effect of the house prices on the number that obtain an outstanding rating. Specifically, a 1% increase in house prices leads to an increase in the number of care homes rated as outstanding by approximately three quarters of a standard deviation. Yet, these results are only statistically significant at the 10% level possibly due to the small number of care homes that are rated as outstanding and the small sample of the analysis. Regarding the number of care homes with a bad rating, those care homes that require improvement or are inadequate, a similar increase in house prices leads to a negative and statistically significant effect, equal to nearly 110% of a standard deviation. These results are consistent with the reasoning above, namely that care homes would be upgrading and improving their quality to capture asset-rich private clients. The smaller

magnitude of the effect associated with the OLS specifications in relationship with the effects of IV estimations reassure the idea that endogeneity problems would not be addressed properly in the former cases. These confirms the importance of the IV estimates that account for endogeneity.

[INSERT TABLE 6 HERE]

5. Discussion and conclusion

We contribute to the existing literature on long term care by investigating the causal link between house prices and the provision of social care in England. Our findings suggest that high house prices have a hitherto unexplored social cost that implies a reduction in the provision of long term care. Our estimates show reductions in the number of care homes and the entry rates. Likewise, we find a negative effect of the prices on the average size of care homes, albeit not robust statistically. A potential implication of these results is that high house prices are not as uniformly beneficial to older home-owners as often implied in public debates. That being said, we do find evidence that higher house prices go hand in hand with better quality rated care homes, suggesting that care home providers might be motivated by a desire to attract asset-rich private clients. These findings would be in line with the results from McMillen and Powers (2017) who show evidence with regards to the prevalence of nursing care homes to locate in areas with older and wealthier people or Stevenson and Grabowski (2010) that show similar results for the case of assisted living facilities

Our findings also lend support to the idea that the development of care homes is driven by financial incentives. High house prices suggest that projects which undertake alternative developments to care homes, such as building property houses for example, are a more attractive option for developers' investment. This is because of two core reasons. Housing development entails less opportunity costs and higher profit margins that lead to a better bargaining power for accessing to available developable land. Likewise, the development of care homes is associated with less fiscal incentives, both at local and national level. Regarding this, our findings illustrate potentially important interactions between various areas, such as urban planning and the provision of social care that are responsibility of local authorities at different level. Our results can contribute to inform the reforms based on an increase of the local government funding and that directly involve the housing market and that present substantial trade-offs. For instance, the introduction of new national grants, such as the New Homes Bonus in 2011, aiming at encouraging the development of new residential properties,

may compromise the provision of long term care. Notwithstanding, the funding derived from these grants may be used to alleviate the current funding needs in the social care. Disentangling these relationships, given the context of constant reforms in the local public finance, may be a future avenue of research.

These findings should be read alongside the current funding schemes for social care where the value of the properties plays a key role, especially for those people residing in care homes. In these cases, the value of the property is included in for means-test that determines the public support buy the local authorities. Likewise, the value of the property is considered for assuming the cost of deferred payments in those patients that are in a care home and decide to postpone the payment of their care. Under these situations, homes can be sold to pay the local authorities. Hence, from the perspective of a local authority, higher house prices would entail greater revenues that could be used to meet its funding requirements. Likewise, higher house prices could also contribute to increase the council tax, which is the main important source of local revenue and that is partially used for meeting the needs of local governments in terms of long term care. Despite long term care has been an area relatively protected from the budgetary constraints occurred since 2010 (Smith et al. 2016), both local authorities and national government need to agree in a funding scheme to meet the rising needs and the challenges derived from the provision and funding of long term care in residential care homes.

References

AGEUK 2017. Briefing: Health and Care of Older People in England 2017. AgeUK.

AUDRETSCH, D. B. & FRITSCH, M. 1994. On the measurement of entry rates. *Empirica,* 21**,** 105-113.

BARRON, D. N. & WEST, E. 2017. The quasi-market for adult residential care in the UK: Do for-profit, not-for-profit or public sector residential care and nursing homes provide better quality care? *Social Science and Medicine,* 179**,** 137-146.

BERTRAND, M. & KRAMARZ, F. 2002. Does entry regulation hinder job creation? Evidence from the French retail industry. *The Quarterly Journal of Economics,* 117**,** 1369-1413.

CAMPBELL, R. 2015. Investment in care homes. *British Property Federation*.

CARE QUALITY COMMISSION. 2016. The state of health care and adult social care in England 2015/16. Care Quality Commission.

CHESHIRE, P. 2009. Urban land markets and policy failures.

CHESHIRE, P. C., HILBER, C. A. L. & KAPLANIS, I. 2014. Land use regulation and productivity - land matters: evidence from a UK supermarket chain. *Journal of Economic Geography***,** 43-73.

CHESHIRE, P., HILBER, C.A. & KOSTER, H.R., 2015. Regulating housing vacancies away? The paradoxical effects of mismatch.

DARTON, R., FORDER, J., NETTEN, A., BEBBINGTON, A., HOLDER, J. & TOWERS, A.-M. 2010. Slicing up the pie: allocation of central government funding of care of older people. *Social Policy and Administration,* 44**,** 529-553.

FICHERA, E. & GATHERGOOD, J., 2016. Do wealth shocks affect health? New evidence from the housing boom. *Health economics*, *25*(S2), pp.57-69.

FORDER, J. & ALLAN, S. 2014. The impact of competition on quality and prices in the English care homes market. *Journal of Health Economics,* 34**,** 73-83.

GRABOWSKI, D. C. 2004. A longitudinal study of Medicaid payment, private-pay price and nursing home quality. *International journal of health care finance and economics,* 4**,** 5-26.

GRIFFITH, R. & HARMGART, H. 2008. Supermarkets and planning regulation. *CEPR Discussion Paper,* 6713.

HANCOCK, R. & HVIID, M. 2010. Buyer power and price discrimination: the case of the UK care homes market. ISER Working Paper Series.

HASKEL, J. & SADUN, R. 2012. Regulation and UK retailing productivity: evidence from microdata. *Economica,* 79**,** 425-448.

HENRETTY, N. 2017. Housing affordability in England and Wales: 1997 to 2016. Office of National Statistics.

HILBER, C. A. L. 2015. UK Housing and Planning Policies: the evidence from economic research. *Centre of Economic Performance election analysis series*.

HILBER, C. A. L. 2017. Britain's Housing Crisis: causes and cures. Presentation at the Department of Geography and Environment. *London School of Economics*.

HILBER, C. A. L. & ROBERT-NICOUD, F. E. D. E. R. 2013. On the origins of land use regulations: Theory and evidence from US metro areas. *Journal of Urban Economics,* 75**,** 29-43.

HILBER, C. A. L. & SCHONI, O. 2016. Housing Policies in Switzerland, the United Kingdom, and the United States.

HILBER, C. A. L. & VERMEULEN, W. 2016. The Impact of Supply Constraints on House Prices in England. *The Economic Journal,* 126**,** 358-405.

HILLER, N. & LERBS, O. W. 2016. Aging and urban house prices. *Regional Science and Urban Economics,* 60**,** 276-291.

HUMPHRIES, R., THORLBY, R., HOLDER, H., HALL, P. & CHARLES, A. 2016. Social care for older people: home truths. *London, The King's Fund*.

JARRET, T. 2017. The care home market. The House of Commons Library.

KASCHOWITZ, J. & BRANDT, M. 2017. Health effects of informal caregiving across Europe: A longitudinal approach. *Social Science and Medicine,* 173**,** 72-80.

KING, N. 2011. Planning Use Classes and Extra Care Housing. Housing Learning & Improvement Network

LE GRAND, J. 1991. Quasi-markets and social policy. *The Economic Journal,* 101**,** 1256-1267.

MACHIN, S., MANNING, A. & RAHMAN, L. 2002. *Where the minimum wage bites hard: the introduction of the UK national minimum wage to a low wage sector*, Centre for Economic Performance, London School of Economics and Political Science.

McMILLEN, D. P., & POWERS, E. T. 2017. The eldercare landscape: Evidence from California. *Health Economics*,*26* (S2), 139-157.

MUKAMEL, D. B. & SPECTOR, W. D. 2002. The competitive nature of the nursing home industry: price mark ups and demand elasticities. *Applied Economics,* 34**,** 413-420.

NETTEN, A., DARTON, R. & WILLIAMS, J. 2003. Nursing home closures: effects on capacity and reasons for closure. *Age and Ageing,* 32**,** 332-337.

NETTEN, A., WILLIAMS, J. & DARTON, R. 2005. Care-home closures in England: causes and implications. *Ageing and Society,* 25**,** 319-338.

OFT 2005. Care homes for Older People in the UK: A market study. Office of Fair Trading.

SADUN, R. 2015. Does planning regulation protect independent retailers? *Review of Economics and Statistics,* 97**,** 983-1001.

SANCHEZ VIDAL, M. 2016. Retail shocks and city structure. *IEB Working Paper Series, 2016/12*.

SCHIVARDI, F. & VIVIANO, E. 2011. Entry barriers in retail trade. *Economic Journal,* 121**,** 145-170.

SMITH, N. A., PHILLIPS D., SIMPSON, P., EISER, D. & TRICKEY, M. 2016. A time of revolution: British local government finance in the 2010s *The Institute for Fiscal Studies*.

STAIGER, D. & STOCK, J., 1997. Instrumental Variables Regression with Weak Instruments.*Econometrica*,*65*(3), pp.557-586

STEVENSON, D.G. & GRABOWSKI, D.C., 2010. Sizing up the market for assisted living.*Health Affairs*,*29*(1), pp.35-43.

TOKUNAGA, M. & HASHIMOTO, H. 2013. Factors affecting the entry of for-profit providers into a price regulated market for formal long-term care services: A case study from Japan. *Social Science and Medicine,* 76**,** 143-149.

VAN GROENOU, M. I. B. & DE BOER, A. 2016. Providing informal care in a changing society. *European Journal of Ageing,* 13**,** 271-279.

Tables

Table 1: Summary statistics

	Nobs	Mean	Minimum	Maximum	Stdev
Care homes per 1000 population over 65	630	1.0826	0.2067	2.5524	0.3646
Entry rate (%)	630	1.9704	0	18.75	3.1533
New registered beds	630	15.4984	0	219	30.9596
Average size	630	10.7252	0	135	21.5908
Care homes per quality (outstanding)	630	0.0060	0	0.1049	0.0164
Care homes per quality (bad)	630	0.3325	0	1.9555	0.2006
Average house price	630	245,036	71,447	1,275,969	133,925
Change delay rate	630	-0.0376	-0.6345	0.5310	0.2197
Historical share of Labour votes	630	0.1625	0.0010	0.4103	0.0886
Population density 1911	630	774.6749	3.2504	22,0288	2,634
Share Labour voters (June 2015)	630	0.2809	0.0698	0.7301	0.1449

Table 2: First stage results

	(1)	(2)	(3)
Historical share of Labour voters		-0.9790***	-0.9663***
		(0.2471)	(0.2491)
Change delay rate	-0.1698		-0.1118**
	(0.067)		(0.0563)
Density population 1911	0.0000361***	0.0000468***	0.0000476***
	(8.34e-06)	(7.77e-06)	(7.57e-06)
Observations	630	630	630
Number of local authorities	315	315	315
R-squared	-0.0270	0.1139	0.1102
Sanderson-Windmeijer F test of excluded instruments	11.71***	21.92***	16.79***

Note: The IV regressions using the share of Labour voters also include the contemporaneous share of Labour voters from the General Election in June 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 3: Effect of house prices on number of care homes and rate of market entry

	Number of care homes per population 65 +				Rate of market entry			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Average house prices (log)	-0.3518***	-0.8752***	-0.4657**	-0.5051***	-0.2053	-2.1529	-2.4421**	-2.4234**
	(0.078)	(0.212)	(0.181)	(0.172)	(0.516)	(1.531)	(1.241)	(1.207)
Estimation	OLS	IV	IV	IV	OLS	IV	IV	IV
Observations	630	630	630	630	630	630	630	630
Number of local authorities	315	315	315	315	315	315	315	315
R-squared	0.1155	-0.0270	0.1139	0.1102	0.0080	-0.0184	-0.0205	-0.0200
Change of delay		x		x		x		x
Share of Labour voters			x	x			x	x
Density population 1911		x	x	x		x	x	x

Note: The IV regressions using the share of Labour voters also include the contemporaneous share of Labour voters from the General Election in June 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 4: Effect of lagged house prices on number of care homes and rate of market entry

	Number of care homes per population 65 +				Rate of market entry			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Lagged average house prices (log)	-0.3485***	-0.8413***	-0.4624***	-0.4991***	-0.2022	-2.0744	-2.3253*	-2.3159**
	(0.081)	(0.207)	(0.173)	(0.165)	(0.526)	(0.568)	(1.197)	(1.168)
Estimation	OLS	IV	IV	IV	OLS	IV	IV	IV
Observations	630	630	630	630	630	630	630	630
Number of local authorities	315	315	315	315	315	315	315	315
R-squared	0.1121	-0.0098	0.1116	0.1086	0.0080	-0.0155	-0.0160	-0.0157
F statistic of instruments		11.21***	21.02***	16.06***		11.21***	21.02***	16.06***
Change of delay		x		x		x		x
Share of Labour voters			x	x			x	x
Density population 1911		x	x	x		x	x	x

Note: The IV regressions using the share of Labour voters also include the contemporaneous share of Labour voters from the General Election in June 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 5: Effects of house prices on capacity

	New registered beds				Average size			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Average house prices (log)	-4.0768	-3.655	-13.039	-7.713	-3.6455	0. 0328	-13.367*	-8.038
	(5.330)	(11.003)	(8.607)	(8.956)	(3.938)	(8.841)	(6.555)	(6.602)
Estimation	OLS	IV	IV	IV	OLS	IV	IV	IV
Observations	630	630	630	630	630	630	630	630
Number of local authorities	315	315	315	315	315	315	315	315
R-squared	0.0150	0.0150	0.0094	0.0151	0.0118	0.0098	-0.0015	0.0090
Change of delay		x		x		x		x
Share of Labour voters			x	x			x	x
Density population 1911		x	x	x		x	x	x

Note: The IV regressions using the share of Labour voters also include the contemporaneous share of Labour voters from the General Election in June 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 6: Effects of house prices on care homes by quality rating

	Quality outstanding				Quality bad			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Average house prices (log)	0.0019	0.0107	0.0118*	0.0105	-0.1655***	-0.2218***	-0.0826	-0.1032
	(0.002)	(0.008)	(0.007)	(0.007)	(0.036)	(0.083)	(0.075)	(0.071)
Estimation	OLS	IV	IV	IV	OLS	IV	IV	IV
Observations	630	630	630	630	630	630	630	630
Number of local authorities	315	315	315	315	315	315	315	315
R-squared	0.0748	0.0552	0.0501	0.0561	0.2106	0.2051	0.2003	0.2047
Change of delay		x		x		x		x
Share of Labour voters			x	x			x	x
Density population 1911		x	x	x		x	x	x

Note: The IV regressions using the share of Labour voters also include the contemporaneous share of Labour voters from the General Election in June 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Figures

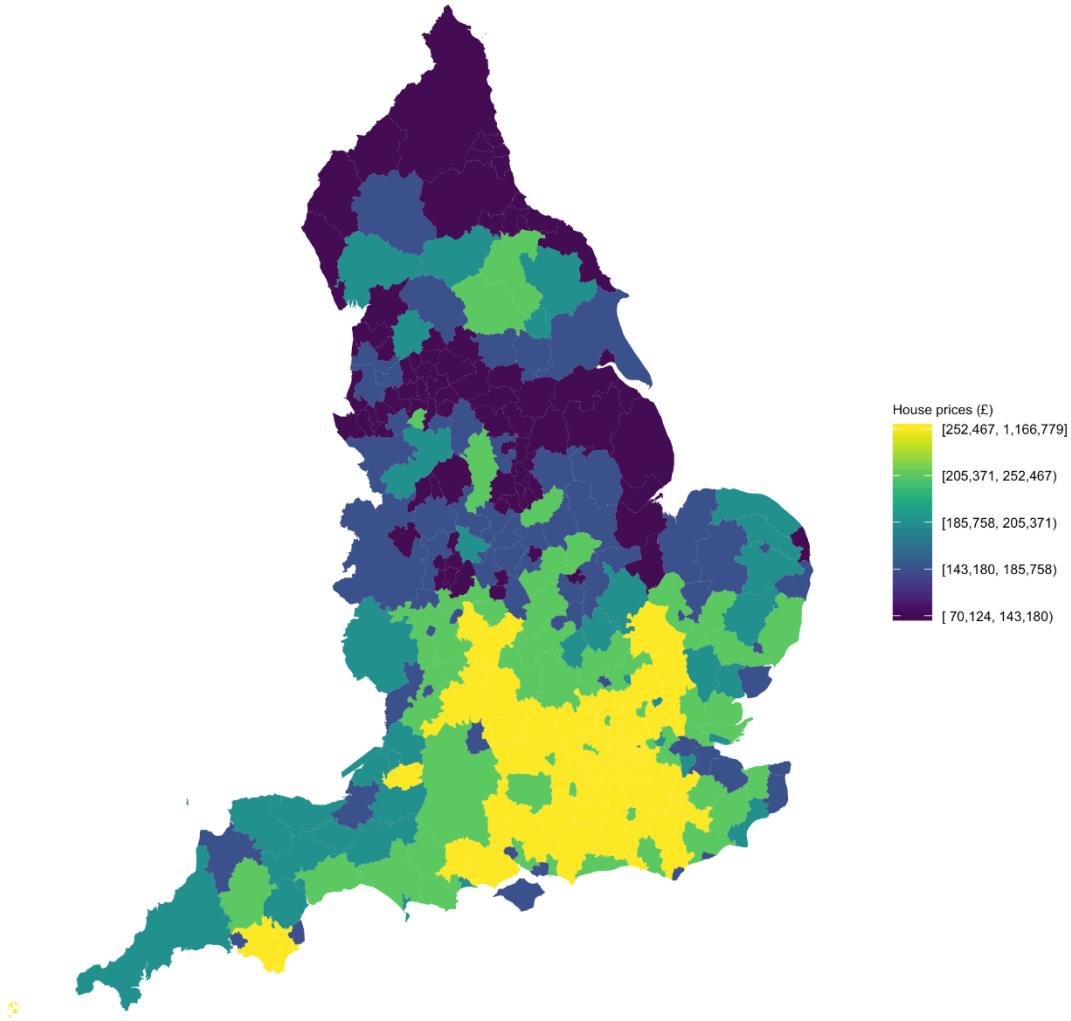

Figure 1: Average house prices - England, district level

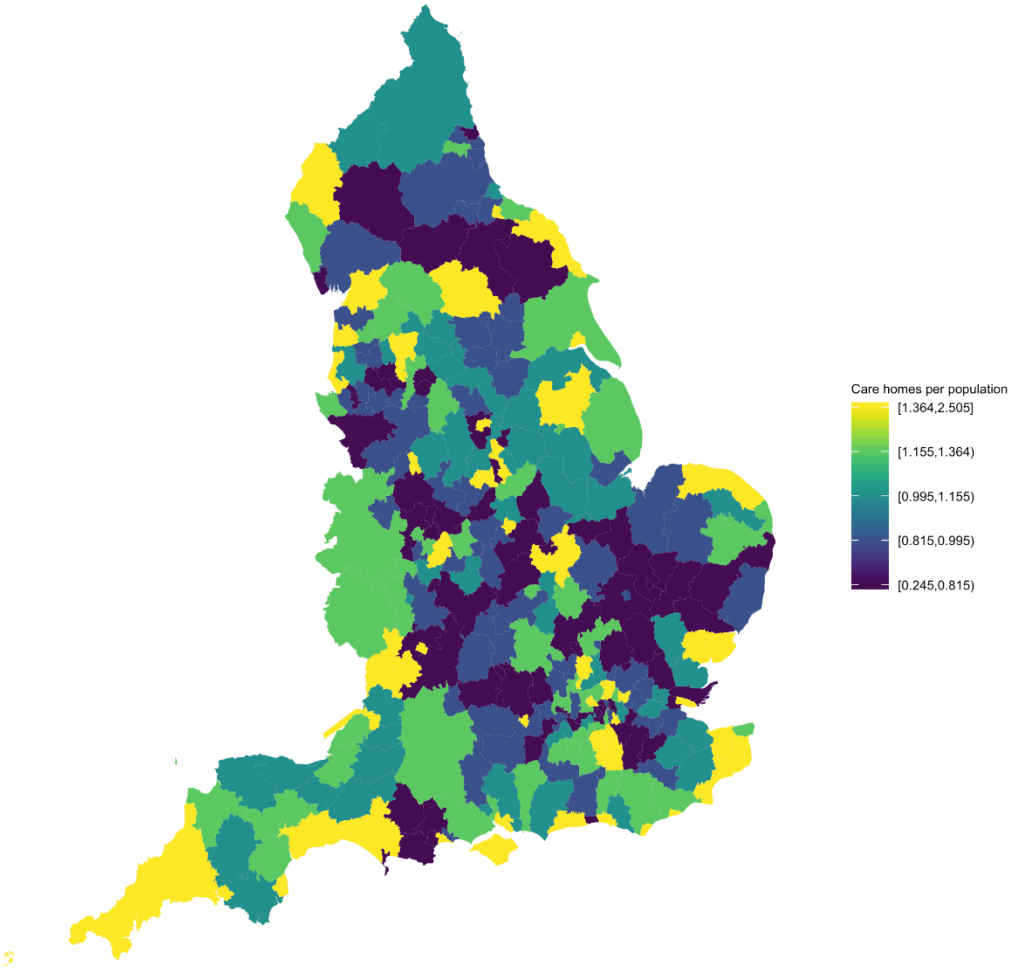

Figure 2: Care homes per 1000 population over 65 - England, district level

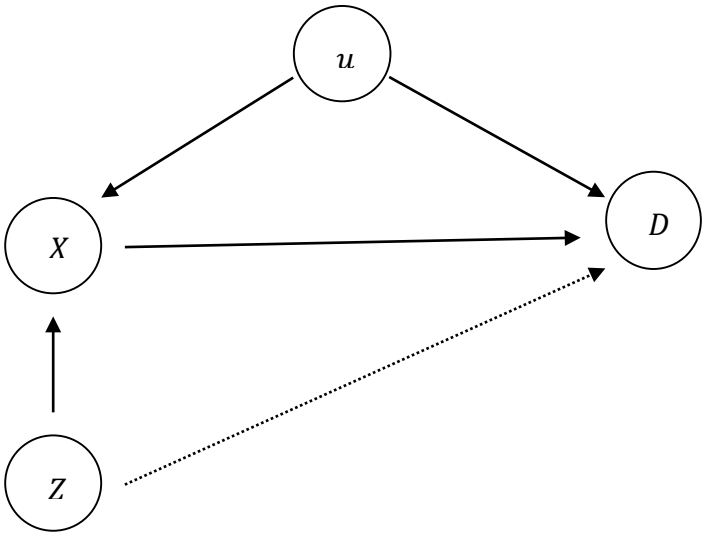

Figure 3: Diagram of causal links between instruments

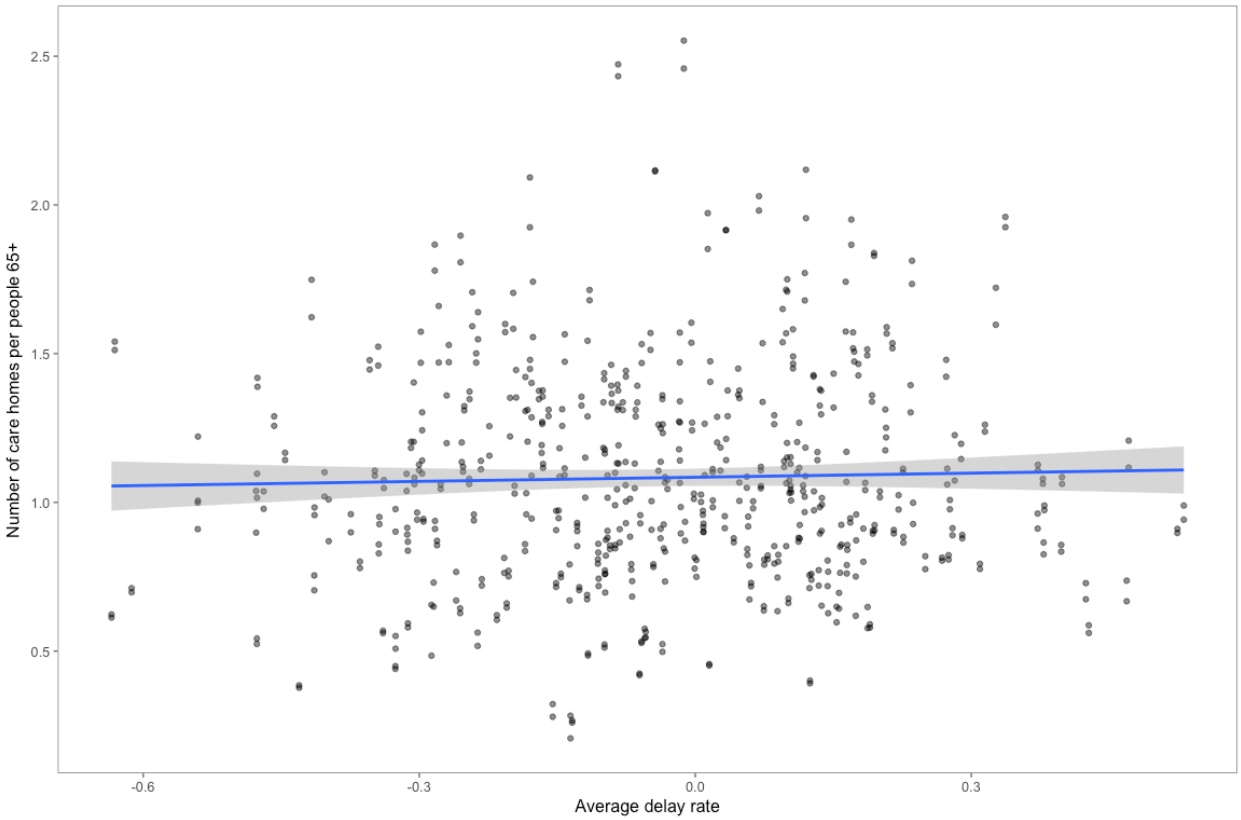

Figure 4: Number of care homes and average rate of delay